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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/787,373	DODGSON, TERENCE EDWIN	
	Examiner	Art Unit	
	Nathan H. Brown, Jr.	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office Action is responsive to the communication for application 10/787,373, filed April 16, 2007.

2. Claims 1-4 and 6-10 are pending. Claims 1, 3, and 4 are currently amended. Claim 5 is cancelled. Claims 2 and 6-10 were previously presented.

3. After the previous office action, claims 1-4 and 6-10 stood rejected.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-4 and 6-10 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: algorithm.

Amended independent claim 1 recites a "method of training a neural network to perform decoding of a time-varying signal comprising a sequence of input symbols". Although, the claim recites: "wherein the input symbol is transmitted together with the plurality of output symbols to

a communications network decoder", this simply constitutes an output step of the algorithm, especially considering that the claim recites no further interaction in the method with "the communications network decoder". Methods of training neural networks are well known algorithms classified according their convergence properties and complexity. Claim 1 recites no more than the § 101 judicial exception of an algorithm. Claim 1 entails no physical transformation and while the actual performance of decoding a time-varying signal comprising a sequence of input symbols may be concrete and useful, the tangible requirement does require that the claim recite more than a § 101 judicial exception, *and* set forth a practical application of that § 101 judicial exception to produce a real-world result; like a final share price which can be fixed for recording and reporting and accepted and relied upon by regulatory authorities or a measurement of blood sugar level used in a medical diagnosis. Claim 1 has no such result. Claim 1 simply recites a neural network gets trained and its output goes into a "communications network decoder" with no consequence. Since claim 2 depends from claim 1 without fixing the deficiency of claim 1, claims 1 and 2 are considered to be non-statutory under 35 U.S.C. 101.

Amended independent claim 3 recites:

> A method of encoded communications in which input symbols are convolutionally encoded to provide, for each input symbol, a plurality of output symbols which depend on the input symbol, and the input symbol is transmitted together with the plurality of output symbols to a *communications network* for decoding encoded communications in which received input symbols are convolutionally encoded to provide, for each received input symbol, a plurality of output symbols which depend on the input symbol, *connected so as to feed back* to its inputs at least some of the decoded symbols it generates at its outputs, wherein at least one of the input symbols is transmitted to the *neural network* together with the coded output symbols, and fed to its inputs together with the fed-back decoded symbols. [emphasis added]

Clearly, claim 3 recites no more than an algorithm in which a "communications network for decoding" receives input data and feeds it back to itself before it is "transmitted to the neural network" for no recited result. Clearly, an algorithm producing *no* result doesn't produce a practical result. Therefore, claim 3 is considered to be non-statutory under 35 U.S.C. 101.

Amended independent claim 4 recites:

> A *neural network* for decoding encoded communications in which input symbols are convolutionally encoded to provide, for each input symbol, a plurality of output symbols which depend on the input symbol, *connected so as to feed back* to its inputs at least some of the decoded symbols it generates at its outputs, wherein at least one of the input symbols is transmitted to the *communications network* decoder together with the coded output symbols, and fed to its inputs together with the fed-back decoded symbols. [emphasis added]

Clearly, claim 4 recites no more than an algorithmic learning model (i.e., neural network) in which a "neural network for decoding" receives input data and feeds it back to itself before it is "transmitted to the "communications network" for no recited result. Therefore, claim 4 is considered to be non-statutory under 35 U.S.C. 101. Since claims 6-10 depend from claim 4 without fixing the deficiency of claim 4, claims 4 and 6-10 are considered to be non-statutory under 35 U.S.C. 101.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being anticipated by *Hassoun*, "Fundamentals of Artificial Neural Networks", 1995 in view of *Ejiri et al. (Ejiri)* (USPN: 4,972,473).

Regarding claim 1. *Hassoun* teaches a method of training a neural network to perform decoding of a time-varying signal (*see* pp. 254- 259, §5.4.1 Time-Delay Neural Networks) comprising a sequence of input symbols (*see* Figure 5.4.3 and p. 256, last para. *Examiner interprets u(t) to be input symbols.*), which is coded by a convolutional coder (*see* Figure 5.4.3 and p. 257, second para. *Examiner interprets the plant to be a convolutional coder and x(t) to be the coded output of the plant.*) such that each coded output symbol depends on more than one input symbol (*see* p. 259, Equation (5.4.4), *Examiner notes the functional dependence of x(t+1) on u(t-1) and u(t).*), characterized by repetitively:

providing a plurality of successive input symbols to the neural network and to the coder (*see* p. 258, Figure 5.4.3, *Examiner interprets u(t), u(t-1),...,u(t-m) to be a plurality of successive input symbols to the neural network and plant.*),

comparing the network outputs with the input signals (*see* p. 259, Equation (5.4.4), *Examiner notes the gating effect of the product of x(t)x(t-1)x(t-2)u(t-1) in the numerator of (5.4.4) acts as a comparator of network outputs y (i.e., xhat(t+1)) which approximate the plant output x(t) over the training period.*); and

adapting the network parameters to reduce the differences there between (*see* p. 259, "Incremental backprop was used to train the network...", *Examiner provides Official Notice that incremental backprop (i.e., error backpropagation) adapts the network parameters (i.e., weights) as a function of the difference between the network output and a target output (e.g., plant output) (see p. 199 Equation (5.1.2)).*).

Hassoun doesn't teach that the input symbol is transmitted together with the plurality of output symbols to a communications network decoder. However, *Ejiri* does teach that the input symbol is transmitted together with the plurality of output symbols to a communications network decoder (*see* Fig. 1 and Abstract, "a first multi-layered neural network of three or more layers which has weighting coefficients to output the same data as the input data for the data extracted from each block and which can output data from an intermediate layer; the transmission data extracted from each block being inputted to the first neural network and outputted from the intermediate layer; means for encoding the transmission data which is outputted from the intermediate layer of the first neural network and, thereafter, transmitting; means for receiving and decoding the transmitted data", *Examiner interprets "the input data" to be contain the input symbol, the output from the "intermediate layer" to be the plurality of output symbols, and the "means for receiving and decoding the transmitted data" to be a communications network decoder (see Fig. 1, item 16).*). It would have been obvious at the time the invention was made

to persons having ordinary skill in the art to combine *Hassoun* with *Ejiri* to obtain a new data communication apparatus in which an intentional disturbance is applied to data to be transmitted, by using a neural network, thereby preventing the interception of the data during the data transmission.

Regarding claim 2. *Hassoun* teaches a method according to claim 1, further comprising supplying the network not only with the coded output symbols but also with at least some of the plurality of successive input symbols (*see* p. 258, Fig. 5.4.3, *Examiner notes that the plurality of successive input symbols, u(t), u(t-1), ..., u(t-m), are input to the neural network along with the coded output symbols x(t), x(t-1), ..., x(t-n).*)

8. Claims 3 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by *Wang et al. (Wang)*, (USPN 5,548,684).

Regarding claim 3. *Wang* teaches a method of encoded communications in which input symbols are encoded by convolution (*see* Fig. 1 and col. 5, lines 65-67) to provide, for each input symbol, a plurality of output symbols which depend on the input symbol (*see* col. 1, lines 41-57, *Examiner interprets a bit to be a symbol (of 'yes' or 'no').*), and the input symbol is transmitted together with the plurality of output symbols to a communications network for decoding (*see* col. 1, lines 14-29, *Examiner interprets the "convolutional code words y" to be the input symbol and the plurality of output symbols.*).

Regarding claim 7. *Wang* teaches a device according to claim 4, including an integrated circuit comprising a plurality of neuron computation devices operating to perform said neuron computations in parallel (*see* col. 13, lines 20-30, *Examiner interprets a "VLSI implementation" to comprise an integrated circuit.*).

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being anticipated by *Wang* in view of *Ejiri.*

Regarding claim 4. *Wang* teaches a neural network for decoding encoded communications in which input symbols are convolutionally encoded (*see* col. 6, lines 32-40) to provide, for each input symbol, a plurality of output symbols which depend on the input symbol (*see* col. 1, lines 41-57, *Examiner interprets a bit to be a symbol (of 'yes' or 'no').*), connected so as to feed back to its inputs at least some of the decoded symbols it generates at its outputs (*see* Fig. 5A, item 72, and col. 7, lines 44-49). Wang does not teach at least one of the input symbols is transmitted to the communications network decoder together with the coded output symbols, and fed to its inputs together with the fed-back decoded symbols. However, *Ejiri* does teach at least one of the input symbols is transmitted to the communications network decoder together with the coded output symbols, and fed to its inputs together with the fed-back decoded symbols (*see* Fig. 1 and Abstract, "a first multi-layered neural network of three or more layers which has weighting coefficients to output the same data as the input data for the data extracted from each block and which can output data from an intermediate layer; the transmission data extracted from each block being inputted to the first neural network and outputted from the intermediate layer; means

for encoding the transmission data which is outputted from the intermediate layer of the first neural network and, thereafter, transmitting; means for receiving and decoding the transmitted data", *Examiner interprets "the input data" to be contain the input symbol, the output from the "intermediate layer" to be the plurality of output symbols, and the "means for receiving and decoding the transmitted data" to be a communications network decoder (see Fig. 1, item 16).*). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Wang* with *Ejiri* to obtain a new data communication apparatus in which an intentional disturbance is applied to data to be transmitted, by using a neural network, thereby preventing the interception of the data during the data transmission.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Wang et al.* in view of Moore et al., "Classification of RF transients in space using digital signal processing and neural network techniques", 1995.

Regarding claim 6. *Wang et al.* teach a device according to claim 4. *Wang et al.* do not teach a programmable signal processing device programmed to perform said plurality of neuron computations on a signal. However, *Moore et al.* do teach a programmable signal processing device programmed to perform said plurality of neuron computations on a signal (*see* Abstract, "The FORTE' payload will employ an Event Classifier to perform onboard classification of radio

frequency transients from terrestrial sources such as lightning. These transients are often dominated by a constantly

changing assortment of man-made "clutter" such as TV, FM, and radar signals. The FORTE' Event Classifier, or EC, uses specialized hardware to implement various signal processing and neural network algorithms. The resulting system can process and classify digitized records of several thousand samples onboard the spacecraft at rates of about a second per record.", *also see*, §4. EVENT CLASSTFIER IMPLEMENTATION). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Wang et al.* with *Moore et al.* for the purpose of allowing onboard classification of radio frequency transients.

Regarding claim 8. *Wang et al.* teach a neural network according to claim 4. *Wang et al.* do not teach a communications terminal device operable to communicate selectively over a communications channel in a plurality of different communications modes, comprising a data processing device for processing time-varying signals, said data processing device being arranged to implement a neural network. *Moore et al.* do teach a communications terminal device (*see* p. 3, Fig. 1, Examiner interprets the FORTE' payload to be a communications terminal device.) operable to communicate selectively over a communications channel in a plurality of different communications modes (*see* p. 3, Fig. 1, Examiner interprets command uplink and data downlink to be different communications modes.), comprising a data processing device for processing time-varying signals (see §4. EVENT CLASSTFIER IMPLEMENTATION, p. 7, Fig. 4, "The C30 DSP performs the computations for the signal preprocessing and classification."), said data processing device being arranged to implement a

neural network (*see* §5. DISCUSSION, pp. 9-10). It would have been obvious to persons having ordinary skill in the art at the time of applicant's invention to modify *Wang et al.* as taught by *Moore et al.* for the purpose of allowing onboard classification of radio frequency transients.

Response to Arguments

11. Applicant's arguments filed April 16, 2007 have been fully considered but they are not persuasive.

<u>Rejection of Claims 1-3, 4 and 6-10 Under 35 U.S.C. §101</u>

Applicant argues:

> Regarding the rejection of Claims 1-3, 4 and 6-10 under 35 U.S.C. §101, the Examiner states, "Training neural networks is well known to be an algorithm process of repeatedly adjusting the weights (parameters) of a neural network model until the error between the output by the neural network and the desired output for each input-output pair to be handled by the neural network is minimized." Independent Claims 1, 3 and 4 have been amended to obviate the rejection.

Examiner responds:

> Amended claim 1 recites a "method of training a neural network to perform decoding of a time-varying signal comprising a sequence of input symbols". Although, the claim recites: "wherein the input symbol is transmitted together with the plurality of output

symbols to a communications network decoder", this only constitutes an output step of the algorithm, especially considering that the claim recites no further interaction in the method with "the communications network decoder". Therefore, claim 1 is still considered to be non-statutory under 35 U.S.C. 101.

Amended claim 3 recites no more than an algorithm in which a "communications network for decoding" receives input data and feeds it back to itself before it is "transmitted to the neural network" for no recited result. An algorithm producing *no* result can't produce a practical result. Therefore, claim 3 is still considered to be non-statutory under 35 U.S.C. 101.

Amended claim 4 recites no more than an algorithmic learning model (i.e., neural network) in which a "neural network for decoding" receives input data and feeds it back to itself before it is "transmitted to the "communications network" for no recited result. Therefore, claim 4 is still considered to be non-statutory under 35 U.S.C. 101.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained

from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Nathan H. Brown, Jr.
June 30, 2007